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ABSTRACT

This document contains (1) the final report of a project to develop a computer-aided drafting (CAD) curriculum and (2) a competency-based unit of instruction for use with the CADAPPLE system. The final report states the problem and project objective, presents conclusions and recommendations, and includes survey instruments. The unit is designed for second-year vocational drafting students with a solid background in mechanical drafting. Computer experience is helpful but not required. Introductory materials include a list of required hardware, software, and materials; student competencies; student objectives; and lesson procedure. Five sections cover terminology, input, create, modify, and levels. The first page of each section provides this information: lists of readings and worksheets, statement of the problem, and steps of procedure. Each section also provides handouts and worksheets. Other contents include instructions for (1) doing a detail drawing as a final project for the unit, (2) getting CADAPPLE "up," (3) preparing CADAPPLE for "A" or "B" size drawing, (4) saving one's work, (5) loading a drawing, and (6) plotting the drawing. (YLB)

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FINAL REPORT

Competency Based Computer Aided Drafting Curriculum for Vocational Drafting

Project Number
84-131/132-600-2(004-110)(E)

by
Greg Peck
Mexico Vo-Tech
Mexico, MO

4/18/84

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ABSTRACT

With the growing need for Computer Aided Drafting training throughout the nation, vocational programs need curriculum materials that would be used to train students to use this new equipment. It needs to offer flexible scheduling yet cover the core of CAD functions. The greatest need is for use with the CADAPPLE system, the only material available is not designed for use in a vocational program due to the lack of time available. The CAD system should introduce CAD and high tech, motivate students and reinforce basic drafting skills.

Competencies were established with the help of local industry and training institutions. These competencies stress the features that make CAD an efficient tool and not hardware dependent features such as turning the system on and plotting the final drawing.

The material that was developed list these competencies in order of their priority and each is covered in the assignments. The student, upon completing the unit, will be familiar with and have used each of the skills or features listed in the competencies. The material is for use with the CADAPPLE system which is being used in more programs in Missouri than any other system of its kind.

BODY

STATEMENT OF PROBLEM

Low cost Computer Aided Drafting systems that emulate their big brothers are now avilable for a total system price of less than $10,000.00 complete (hardware and software). These systems are capable of reproducing all of the larger systems 2-D drawing functions.

With donations from local industry one of these systems can be purchased for use in Vocational Drafting programs across the state. This would allow students to learn actual Computer Aided Drafting commands, syntax, capabilities etc.. A Computer Aided Drafting project sponsored by the American Vocational Association at Milwaukee Area Technical College has shown that working on these low-cost systems makes it very easy for students to quickly become proficient on large scale Computer Aided Drafting systems.

The problem lies in the fact that there isn't any curriculum materials for use in Vocational Drafting programs. All of the curriculum materials available (very few at that) are designed to be a complete course to train CAD operators. That is not possible in a Vocational Drafting program. We can however accomplish many important activities with this equipment. A few of these are listed below;

1. INTRODUCE CAD and high technology
2. MOTIVATE students into high technology
3. REINFORCE basic drafting skills

Without a doubt, Computer Aided Drafting will attract students to a career in drafting and give those graduates an advantage when CAD systems are installed by employers. But just as importantly, Computer Aided Drafting will produce better fundamental skills. This is accomplished because of the way the Computer Aided Drafting systems operate. Instead of just jumping in and creating a drawing the drafter must work with individual points, lines, tangents, circles etc. This reinforces geometric construction techniques, orthographic projection and gives the student a better understanding of projection theory.

OBJECTIVE

To establish a competency based curriculum for Computer Aided Drafting in Vocational Drafting classes using one of the micro-CAD systems such as CADAPPLE.

Conclusions and Recommendations

In preparing this curriculum competencies were established with the assistance of industry (CAD users) and institutions of higher learning (that train CAD operators). Activities and materials of instructuon were developed to meet these competencies. I hoped to get some input in this area from other programs that have purchased similar equipment but got no response.

The curriculum meets the following conditions yet remains flexible to the requirements of different programs.

1. Minimum equipment specifications.

2. Scheduling flexibility that allows short (1 hour a week) assignments or several of these assignments at a time (related activities combined into one unit)

3. Each work station activity is preceded by written worksheets introducing the new material and stepping through the workstation procedures

The checklist and final test were not completed as agreed when the funding for the project was cut back. Now that the project is completed however, the checklist would be easy for the individual instructor to develop as he or she sees fit and could be used to check student progress toward the competencies. The assignments, especially the "Steps of Procedure" at the end of each section, cleary illustrate student progress. Therefore a final test may not be necessary. The "Steps of Procedure" worksheets serve as a "mini-manual" for each student, detailing step by step how various functions are used.

The material developed applies ONLY to CADAPPLE software. This decreases the usefulness of the project somewhat but provides material where it was needed the most. The majority of the programs in the state are using CADAPPLE and the MATC-CAD software comes with some excellent training material. I had hoped to make the material very general in the beginning but this proved to be impossible with all the differences between software packages.

I have to add that the CADAPPLE system fell short of my expectations in several respects. The system does not support tangents, parallels, endiculars, points, tablet menus or partial deletions. These faults can be covered up in most cases but make it difficult to reinforce geometric construction. Fortunately the MATC-CAD system is very strong in all of these areas and is available at 1/4th the cost of the CADAPPLE software.

I did not feel it was possible for vocational programs to train CAD operators when I started this project. Since then I've seen that it would be very possible for vocational programs to do just that. The students pick up on the workings of CAD very quickly and I'm sure that the better students could move right into a CAD operators job with a minimum of training (hardware specific) on the part of industry.

DISCLAIMER

"The activity which is the subject of this report was supported in whole or in part by funds from the Department of Elementry and Secondary Education, Division of Career and Adult Education. However, the opinions expressed herein do not necessarily reflect the position or policies of the Missouri Department of Elementary and Secondary Education or the Division of Career and Adult Education, and no official endorsement should be inferred."

ATTACHMENTS

The attached survey was sent to the following. The results are listed in order of priority in the instructional material.

A.B. Chance Co.
Centralia, MO

Die Makers Inc.
Monroe City, MO

Westinghouse
Jefferson City, MO

University of Missouri
Columbia, MO

A copy of the letter sent to other micro-CAD user's is also attached. I only recieved 1 response to the letter and it said that they couldn't be of any help.

DISSEMINATION PLAN

Copies of the material shcould be made available through the Research Coordinating Unit upon request. Drafting instructors can be made aware of the package through the Supervisor of Industrial Education.

All of these skills would be used in CAD.

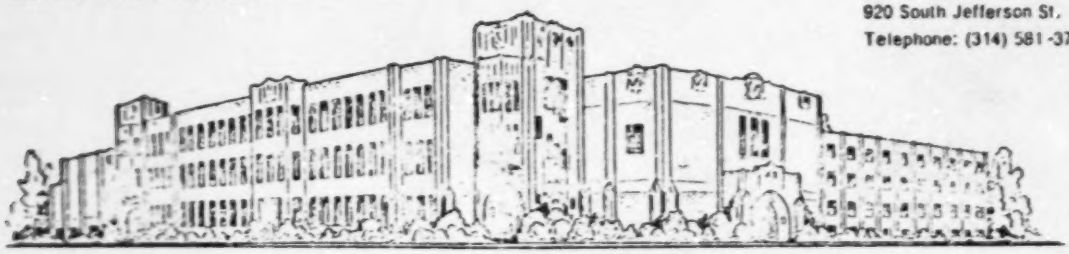
Please rank their importance by circling not more than 5 in each column.

EXIT SKILLS:	not important				very important
Familiar with CAD terminology	1	2	3	4	5
Turn on and turn off system	1	2	3	4	5
Input from keyboard	1	2	3	4	5
Input from tablet	1	2	3	4	5
Input from joystick	1	2	3	4	5
Use grid, increment & free "snap"	1	2	3	4	5
Establish relative coordinates	1	2	3	4	5
Establish absolute coordinates	1	2	3	4	5
Establish polar coordinates	1	2	3	4	5
Save a drawing on disk	1	2	3	4	5
Back-up a drawing on disk	1	2	3	4	5
Get hard copy on plotter	1	2	3	4	5
Assign position of drawing on plotter	1	2	3	4	5
Use automatic dimensioning	1	2	3	4	5
Modify (delete, scale, copy, mirror, move, rotate) an element	1	2	3	4	5
Modify a group (symbols)	1	2	3	4	5
Use several levels in the drawing	1	2	3	4	5
Window (in, out, base)	1	2	3	4	5
Create (arc, curve, circle, eclipse, line, polygon, rectangle, text)	1	2	3	4	5
Use several line styles	1	2	3	4	5
Use symbol library	1	2	3	4	5
Create or add to symbol library	1	2	3	4	5
Crosshatching	1	2	3	4	5
Totals: Not More Than	5	10	15	20	25

COMMENTS:

MEXICO PUBLIC SCHOOLS
MEXICO, MISSOURI 65265

Administrative Offices
Hardin Campus
920 South Jefferson St.
Telephone: (314) 581-3773



TO: Micro CAD Using Instructors

FROM: Greg Peck, Mexico Area Vo-Tech School

DATE: January 27, 1984

SUBJECT: CAD Curriculum

I'm presently developing some curriculum materials to introduce Computer Aided Drafting to my Vocational Drafting students. I have a Cadapple system and have ordered the MATC-CAD software. I would like to get some idea of how you are implementing CAD into your program. This information will help make the curriculum material of more use for all of us. I'd be glad to send you a copy when I finish later this spring.

Please take the time to drop me a note answering the following questions in addition to any comments you may have.

1 How many hours will each student spend on the system?
2 How many hours will each student spend on related classroom assignments?
3 What student will use the system?
4 What will your students be qualified for?
5 What have you dropped from your program in order to add CAD?
6 Are you pleased with your hardware/software?
7 What CAD activity have you had the most success with?
8 What "Words of Wisdom" would you pass on to instructor planning to add CAD?
9 What curriculum materials are you presently using? Is there any area that does not fit your needs in those materials?

My own responce to these questions is attached along with some comments. We're all relatively new at this and I hope that each of us can help one another for the benefit of our students.

cc: Fred Linhardt

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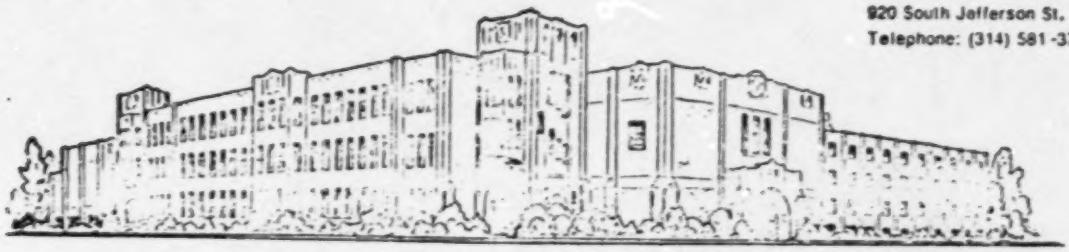

NAME: Greg Peck - Mexico Vo-Tech

SUBJECT: CAD Curriculum Questions

EQUIPMENT: CadApple

1. How many hours will each student spend on the system?
   I plan to have each student spend a minimum of 15 hours on the system.

2. How many hours will each student spend on related classroom assignments?
   I plan to have each student spend a minimum of 15 hours on related activities.

3. What student will use the system?
   Only 2nd year students will use the CadApple system. 1st year have some CAD activities using a microcomputer drawing program. I don't feel 1st year students have the drafting skills to use a CAD system. It also allows for more time on the CadApple since there are fewer students using it.

4. What will your students be qualified for?
   I hope that my students will be qualified to be CAD operator trainees. With a minimum of instruction on the job they should be able to be productive on a CAD system.

5. What have you dropped from your program in order to add CAD?
   I have reduced the time spent on our "end of the year" project from 6 weeks to 4.

6. Are you pleased with your hardware/software?
   This ones tough. I've had no problems once I got the system running. The CadApple can do most anything, but I'm not pleased with the program. It cost to much, I can't afford updates ($750 a year). It plots drawings very slowly, but my biggest gripe is the way it handles primary objects. You can't delete part of an object, objects have no relationship to each other (parallel or perpendicular) and

object can't be placed tangent to another or at the end of a give.. line. I've ordered the MATC-CAD software (which may create hardware problems) because it does not have these weakness!

7. What CAD activity have you had the most success with?
   I haven't had any true CAD activities yet (thats what I'm working on) but I've been very pleased with how well the students have done 'playing' with the system.

8. What "Words of Wisdom" would you pass on to instructors planning to add CAD?
   If you get a CadApple system, spend the money to get a second screen! It makes the system so much easier to use it's hard to describe. One screen shows the graphics and the other displays all menu's and options!

9. What curriculum materials are you presently using? Is there any area that does not fit your needs in those materials?
   I have CadTutor and a few textbooks (Introduction to CAD/McGraw-Hill) and they're fine but I don't have the time to use them. That's why I'm working on some material that can be useful in a shorter amount of classtime. CAD is just another unit in my overall curriculum, it is no more important than any other subject. I recomment "The CAD/CAM Handbook" (free from Computervision) chapter 2.1-A CAD/CAM Story will be required reading for all my students.

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MAY 4 1984

COMPUTER AIDED DRAFTING

A COMPETENCY BASED UNIT OF INSTRUCTION

By Greg Peck
Drafting Instructor
Mexico Area Vo-Tech
May, 1984

REQUIRED
HARDWARE, SOFTWARE & MATERIALS

SOFTWARE - CADAPPLE w/manual, 4 disks, card for digitizer
T & W Systems Inc.
7372 Prince Dr., Suite 106
Huntington Beach, CA 92647

NOTE! All activities are based on Version 2.7a

HARDWARE - As required by CADAPPLE software.
Example: Franklin computer
Monitor
2 disk drives
Super Serial Card
DT-11 Digitizer
DMP-40 Plotter
2nd Monitor (optional)
Videx Vidioterm 80 col. Card (optional)
Joystick

MATERIALS -
1. Copy of entire unit for each student.
2. Diskettes for file storage (should be formatted as outlined in manual)
3. Paper and pens for plotter.

Suggested related material -

1. Unit 2.1
The CAD/CAM Handbook (free)
ComputerVision
201 Burlington Road
Bedford, Massachusetts 01730

2. CAD-TUTOR
CADventures Unlimited
530 North Laurel Avenue
Los Angeles, California 90048

3. Introduction to CAD
McGraw Hill

PREREQUISITES - The unit was designed for second year vocational drafting students with a solid background in mechanical drafting. Computer experiance is helpful but not required.

STUDENT COMPETENCIES

The following competencies were established with the help of industry (CAD users) and educaters (CAD trainers). The competencies are listed in order of thier priority.

1. Use automatic dimensioning
2. Modify (revise)
3. Create (original work)
4. Input from keyboard
5. Absolute coordinates
6. Levels
7. Input from tablet
8. Input from joystick
9. Use of symbol library
10. Terminology
11. Snap
12. Polar coordinates
13. Modify group (symbol)
14. Window
15. Relative coordinates

It was the consensus of those surveyed that the priority be given to those features that make CAD efficient and not hardware dependent features such as back-ups and plotting that vary greatly from one system to another.

Hardware features (CADAPPLE) that are necessary for the completion of the curriculum objectives are provided in the form of step by step guides and are not ment to be instrucyional material.

OBJECTIVES

At the completion of this unit, the student should be able to perform the following tasks on a CADAPPLE (Ver.2.7a) system.

The student will be able to:

1. Verbalize an understanding of CAD terminology.

2. Input information using 4 methods (digitizer (or joystick), absolute, relative and polar)

3. Create 8 elements (arc, circle, ellipse, line, polygon, rectangle, text and dimension) and combine them into groups (symbols).

4. Modify elements and groups using 6 methods (copy, move, scale, image, delete and edit text).

5. Assign groups of elements to particular levels.

LESSON PROCEDURE

1. Review the reading material in the CADAPPLE manual as assigned (related material from CAD-TUTOR is also sugested).

2. Complete the assigned worksheet.

3. Complete assigned problem on the CADAPPLE system.

NOTE: Most problems start from the main menu. Pages labled "Getting CADAPPLE Up" and "Preparing CADAPPLE" provide a step by step procedure for getting the system ready to begin the assignments. Other pages assist in SAVING, LOADING and PLOTTING your work.

Before Starting Unit

Review as much related material as possible, such as, units from your textbook, CAD books, brochures and drawings done on CAD systems.

SECTION 1
TERMINOLOGY

1. READING - CADAPPLE Manual sections 2.11 thru 2.20
Hand-out - CADAPPLE Terminology
CAD/CAM Handbook - chapter 2.1 "A CAD/CAM Story"

Optional - CAD-TUTOR - Introduction p.1 and Input Terminology p.17/35

2. WORKSHEET - "Terminology"

3. PROBLEM - Starting with the MAIN menu (see "getting CADAPPLE up and running & preparing CADAPPLE)
Press 'A' for Add
Experiment with each function, function keys and input modes.

NOTE: To erase screen
Press 'Q' (quit)
Press 'F' (filer)
Press 'N' (new)
Press 'Y' (yes)
Press 'Q' (quit)
Press 'A' (add), returns you to the ADD menu

4. STEPS OF PROCEDURE - none

CADAPPLE
TERMINOLOGY

ESC - abort function currently being performed

STATUS LINE - (4 characters or dots)
- 1st - I, Increment snap on
  G, Grid snap on
  ., Snap off
- 2nd - D, Digitizer input
  J, Joystick input
  A, Absolute input
  R, Relative input
  P, Polar input
- 3rd - T, Tracking on
  ., Tracking off
- 4th - O, Origin has been shifted
  ., Origin has not been shifted

HANDLE POINT - Point by which the cursor "holds on" to an object or group while its being manipulated (see p. 32 CAD-TUTOR)

TEMPLATE - Objects made of dots used as guide lines so that partial objects can be drawn. Objects or groups can become templates from the appropriate modify menu. All templates can be turned on or off from SWITCHES. Templates on the screen are plotted.

FUNCTION KEYS - (p. 51 CAD-TUTOR)

MARKER - All objects can display markers that display thier centers. All markers can be turned on or off in SWITCHES. Displayed markers are not plotted.

GRIDS - Used as guide lines. Established in UNITS. Can be turned on or off in SWITCHES.

Worksheet __1___

Terminology

INSTRUCTIONS: Match the term on the left to the brief definition on the right.

____ 1. CAD
____ 2. menu
____ 3. input device
____ 4. output devise
____ 5. monitor
____ 6. plotter
____ 7. digitizer
____ 8. joystick
____ 9. disk drive
____ 10. disk
____ 11. cursor
____ 12. handle
____ 13. template
____ 14. level
____ 15. marker
____ 16. grids
____ 17. function key
____ 18. element
____ 19. group
____ 20. workfile
____ 21. properties
____ 22. windows
____ 23. coordinates
____ 24. tracking
____ 25. display mode

a. simular to graph paper
b. takes information from user to equipment
c. how the object is viewed-close-up or far away
d. flat surface that provides input
e. takes information from equipment to user
f. x and y position
g. combination of elements (symbol)
h. reads program disk
i. screen (T.V.)
j. full screen graphics, full screen text, combination text, graphics.
k. a transparent layer of the drawing
l. indicates center of line or circle
m. hand held input device
n. Computer Aided Drafting
o. point at which program grabs object
p. crosshairs showing point of input
q. continuous drawing, erasing, & redrawing
r. changes screen mode
s. linestyles, density, level, pen, group name etc.
t. list of options
u. temporary file of drawing data
v. dotted line to serve as a guide
x. makes drawing on paper (output)
y. single line, circle, arc, polygon etc.
z. MAGNETIC MEDIA

SECTION 2
INPUT

1. READING - CADAPPLE Manual sections 2.13 (Input Modes)
2.20 (Input from Keyboard)

Optional - CAD-TUTOR - Coordinate Input Modes p.108
Coordinate Input : Absolute p. 109
Coordinate Input : Relative p. 110
Coordinate Input : Polar p. 110

2. WORKSHEET - "INPUT"

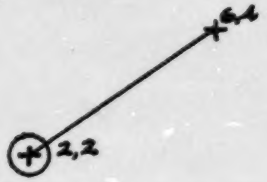
3. PROBLEM - Using Hand-out "CADAPPLE Input Exersize" start in the "ADD" MENU and duplicate the drawing on the hand-out using 4 input modes as outlined on the hand-out.

4. STEPS OF PROCEDURE - Hand-out - "INPUT - Steps of Procedure"

Worksheet __2___

Input

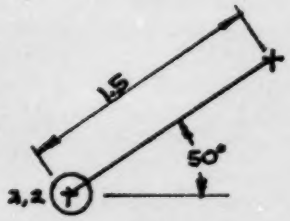
INSTRUCTIONS: Given the illustration on the left, complete the information required to draw the line. Starting points are circled. Point location given in X,Y.

1. 

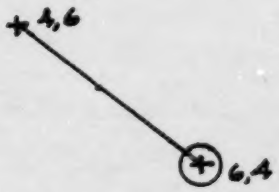
Absolute:
X? _____ Y? _____

2.

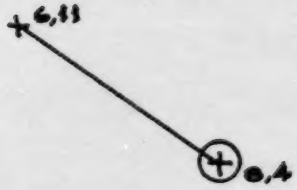
Relative: 4.0000 , 2.0000
X? _____ Y? _____

3. 

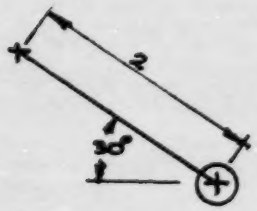
Polar: 2.0000 , 2.0000
Angle? _____ Dist? _____

4. 

Absolute:
X? _____ Y? _____

5. 

Relative: 8.0000 , 4.0000
X? _____ Y? _____

6. 

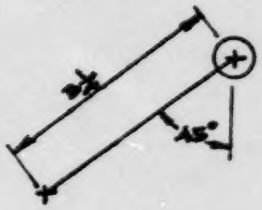
Polar: 5.0000 , 3.0000
Angle? _____ Dist? _____

7.

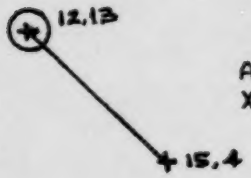
Absolute:
X? _____ Y? _____

8.

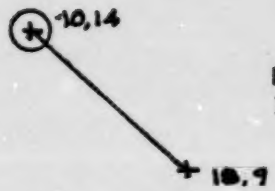
Relative: 9.0000 , 6.0000
X? _____ Y? _____

9. 

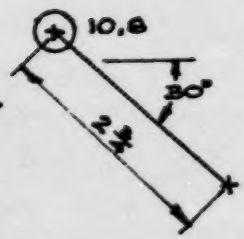
Polar: 14.000 , 10.000
Angle? _____ Dist? _____

10. 

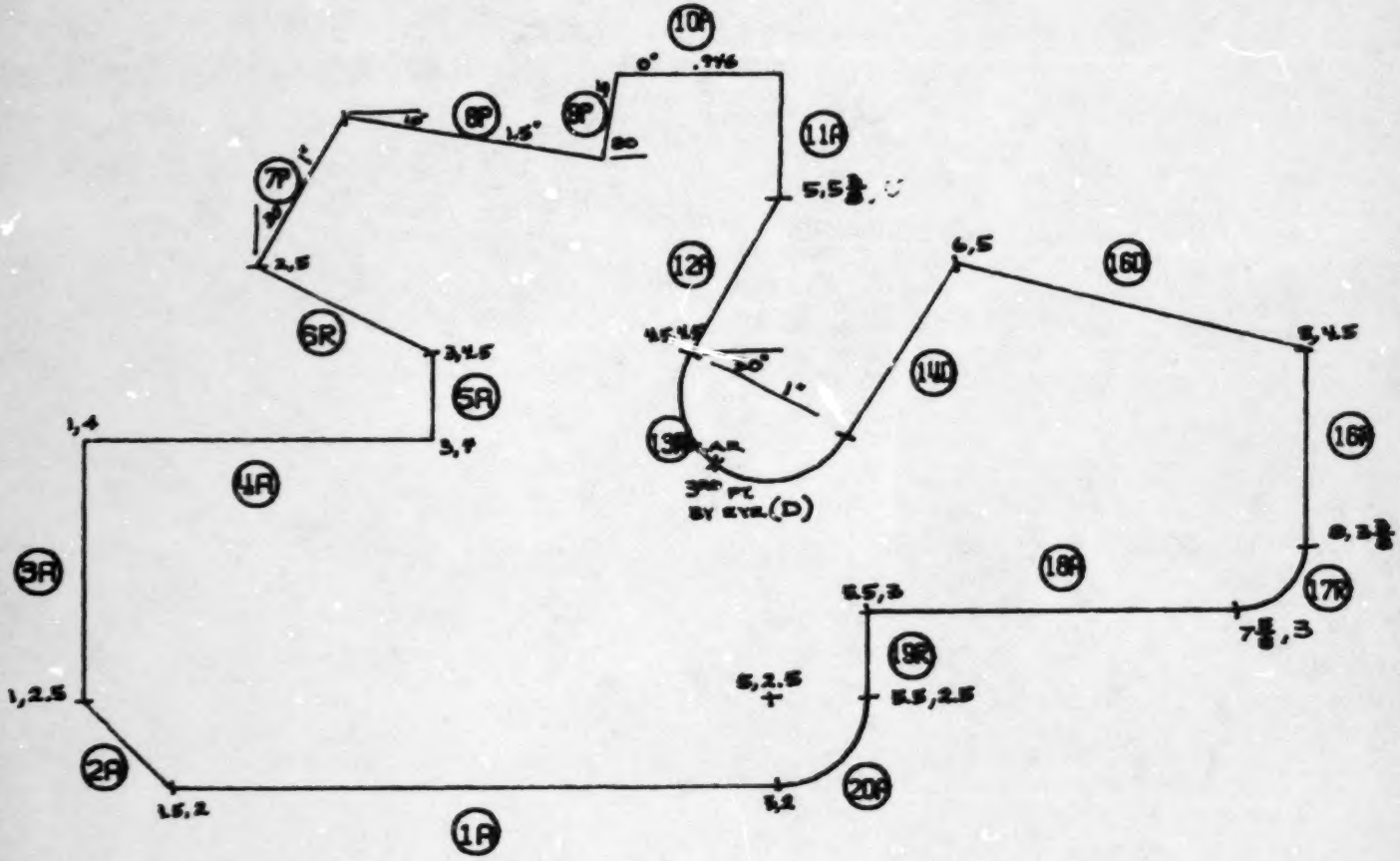
Absolute:
X? _____ Y? _____

11. 

Relative: 10.000 , 14.000
X? _____ Y? _____

12. 

Polar: 10.000 , 8.0000
Angle? _____ Dist? _____



CADAPPLE INPUT EXERCISE

STEPS of PROCEDURE
INPUT

Digitizer - (given prompt for input), input status D

1. Move cursor to desired location (use "snap" where possible)
2. Push button.

Joystick - (given prompt for input), input status D

1. Move cursor to desired location (use "snap" and "scale" where possible)
2. Push button.

Absolute - (given prompt for input), input status D

1. Press _____ until propted for _____ input.
2. Type in the absolute _____ coordinate, press _____ .
3. Type in absolute _____ coordinate, press _____ .

NOTE - Coordinate 0,0 is located in the _____ _____ corner.

Relative - (given prompt for input), input status D

1. Press _____ until prompted for _____ input.
2. Coordinates displayed are the _____ coordinates defined.
3. Type in relative _____ coordinate, press _____ .
4. Type in relative _____ coordinate, press _____ .

NOTE - Relative means in relation to the _____ coordinate entered. Positive and _____ numbers may be used.

Polar - (given prompt for input), input status D

1. Press _____ until prompted for _____ input.
2. Coordinates displayed are the _____ coordinates defined.
3. Type in the _____ of direction. Press _____ .

Note - The angle is measured in a _____ direction from the _____ .

4. Type in the _____ to the polar point. Press RETURN.

SPECIAL NOTE:

1. The reference points are set to _____ , _____ each time you enter the ADD or GROUP menus.

2. The program initializes to the _____ input mode.

3. Input modes can be changed at _____ time, allowing you to define one endpoint of a line in _____ mode and the second endpoint in _____ .

SECTION 3
CREATE

1. READING - CADAPPLE Manual - sections 3.1, 3.2, 3.11
   3.9.8, 3.9.4

   Optional - CAD-TUTOR - Tutorials 2, 5, 6

2. WORKSHEET - CREATE

3. PROBLEM - Using each of the ADD functions at least once, divide the screen into 4 area's (using guidelines) and create a design in each of the 4 area's under a differant GROUP name. (see example hand-out "Create")
   SAVE and PLOT your work.

4. STEPS of PROCEDURE - Hand-out "Steps of Procedure - Create"

Worksheet 3

CREATE

List the basic elements supported by the CADAPPLE system.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

11. Windowing _____ allows you to view an area of the drawing magnified.

12. Windowing _____ allows you to shrink the drawing.

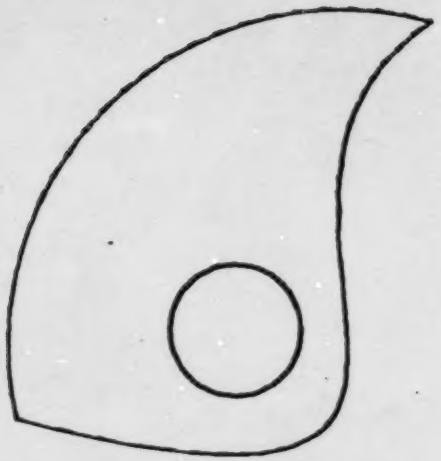
13. To return to the original drawing in the WINDOW menu the _____ option is used.

14. Windows can become part of the workfile by using the _____ option.

15. The group name is limited to _____ characters.

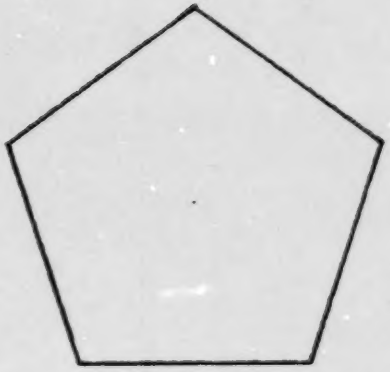
16. To change the group name you use the _____ menu.

CREATE

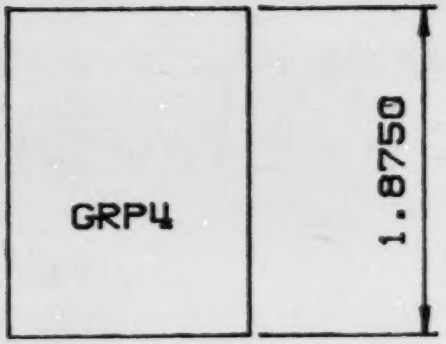


GRP1

GRP2



GRP3



STEPS of PROCEDURE
CREATE

ADD MENU

Arc -
1. Move cursor to first _____ .
   Push button.
2. Move cursor to second _____ .
   Push button.
3. Move cursor to a point _____ the arc.
   Push button.

Bezier Curve -
1. Move cursor to first _____ .
   Push button.
2. Move cursor to second _____ .
   Push button.
3. Move cursor to first _____
   _____ and press "F".
4. Move cursor to second _____
   _____ and press "S".
5. Repeat steps 3 & 4 until desired curve is found.
6. Push button.

Circle -
1. Move cursor to the circle's _____ .
   Push button.
2. Move cursor to the _____ of the desired circle. Push button.

Ellipse -
1. Move cursor to the first endpoint of the _____ axis. Push button.
2. Move cursor to the second endpoint of the _____ axis. Push button.
3. Move cursor to the first _____ of the _____ axis. Push button.

Line -
1. Move cursor to the first _____ of the line. Push button.
2. Move cursor to the second _____ of the line. Push button. (repeat for all _____ lines)
3. Press _____ to start at a new endpoint. (continue with step 2)

Polygon -
1. Select the _____ _____ _____ for the polygon.
2. Move the cursor to the polygons's _____ . Push button.
3. Move the cursor to the polygons _____ . Push button.

Rectangle -
1. Move the cursor to the first _____ of the rectangle. Push button.
2. Move the cursor to the _____ _____ of the rectangle. Push button.

Text -
1. Type up to _____ characters to be displayed on a single _____ .

2. Press RETURN.
3. Move the cursor to the _____ _____ corner of the text position. Push button.
4. Repeat steps 1 thru 3 to add more text to the drawing.
5. Press _____ to quit.

Dimension -

1. Move the cursor to the first _____ of the dimension. Push button.
2. Move the cursor to the second _____ of the dimension. Push button.
3. If nessasary, press _____ or _____ to lock in a vertical or horizontal dimension.
4. Locate _____ of dimension line. Push button.
5. Determine how the dimension is to be displayed by pressing _____ , _____ or "I".
6. Move the cursor to position the dimension _____ . Push button.

Guide -

1. Move the cursor to position the _____ guideline. Push button.
2. If a non- _____ line is needed use options _____ , _____ , _____ and _____ as required.

SECTION 4
MODIFY

1. READING - CADAPPLE Manual - sections 3.3 and 3.5
   Optional - CAD-TUTOR - tutorials 3 and 7

2. WORKSHEET - MODIFY

3. PROBLEM - Load the drawing created in Section 3 "CREATE".

   Use copy, move, scale, image, delete and edit text to modify the 4 designs. (see example Hand-out "MODIFY")

   Use GROUP menu to copy, move, rotate, scale and image the 4 designs. (see example Hand-out "MODIFY GROUP"

   SAVE AND PLOT your work.

4. STEPS of PROCEDURE - Hand-out "STEPS of PROCEDURE - MODIFY"

Worksheet 4

MODIFY

1. Press _____ to find an element to be modified by moving the cursor to the element and pressing the _____ .

2. The _____ option blinks the element to be modified, over and over, so that it can be easily identified.

3. Only _____ element can be acted apon at a time.

4. The _____ and _____ keys allow you to move forward and backward through the objects in the workfile to locate the element to be modified.

5. The _____ option leaves the original element unchanged.

6. The _____ allows you to cange the position of the element.

7. The _____ option allows you to enlarge or reduce a single element.

8. The _____ option allows you to turn or revolve the element around a point.

9. The _____ option makes a copy of the element as it would appear in a mirror.

10. The _____ option removes the element.

11. The _____ _____ option allows you to change notes on the drawing.

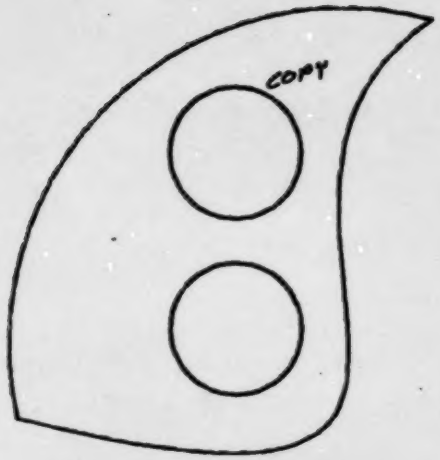
12. The _____ menu allows modifications to be made to several elements at the same time.

13. When using _____ option the program continues to make _____ until _____ is pressed to terminate the option.

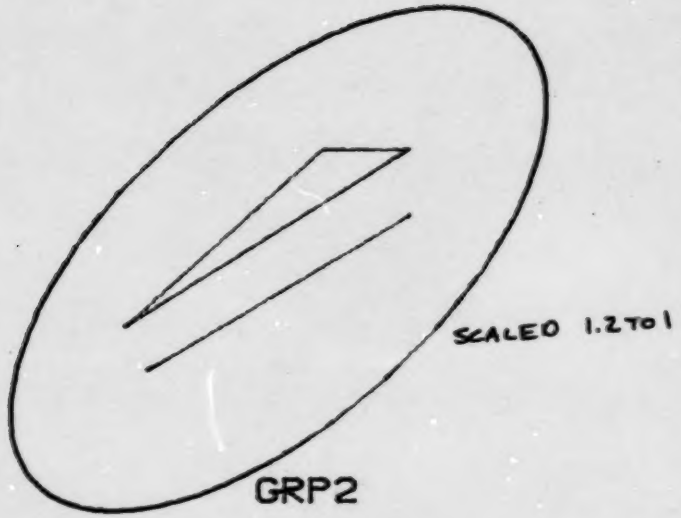
14. The _____ key erases all work done in the current option.

15. The group name is limited to _____ characters.

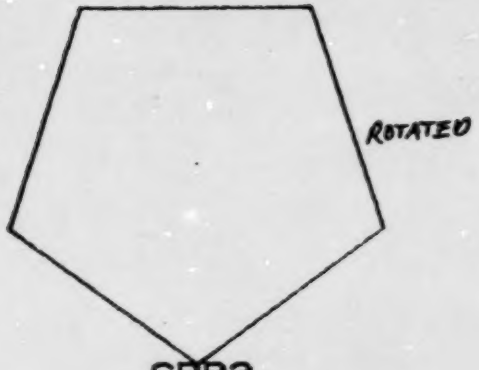
MODIFY



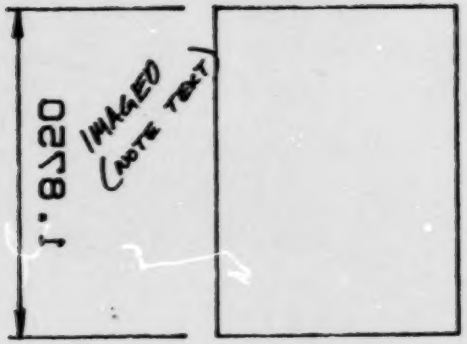
GRP1



GRP2

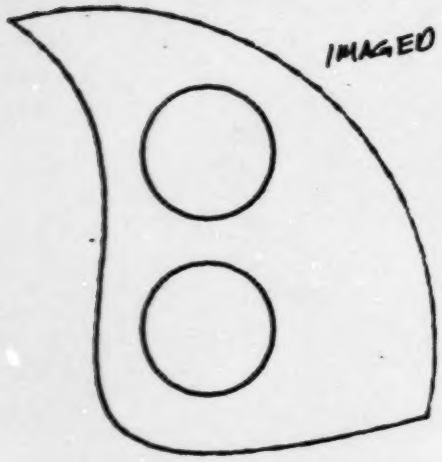


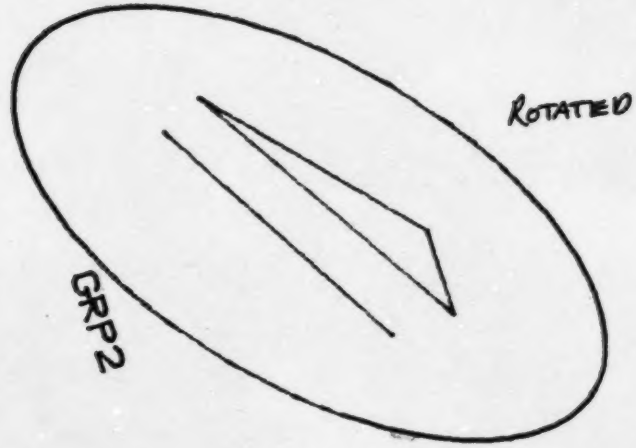
GRP3

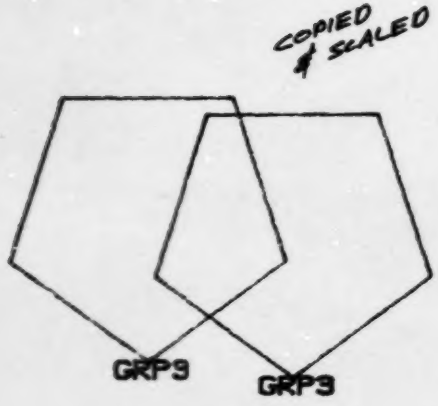


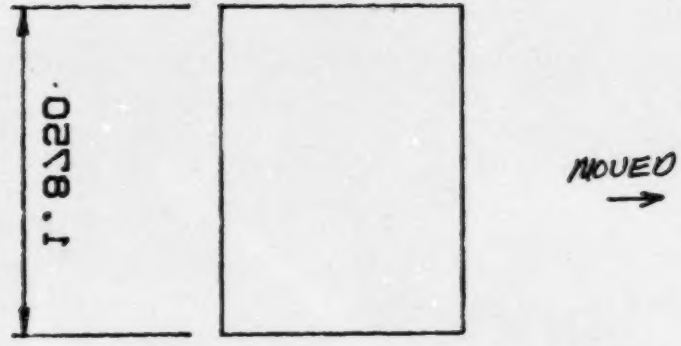
GROUP 4 (GRP4) EDITED TEXT MOVED

MODIFY GROUP









GROUP 4 (GRP4)

STEPS of PROCEDURE
MODIFY

ESCape - 1. The escape key aborts any option and returns everything as it was before the option was selected.

FIND - 1. Before any modify option can be used the element to be modified must be found. Be sure that "tracking" is on so that the element to be modified will _____ .

2. Press _____ .

3. Move the cursor to the _____ to be modified and press the _____ .

4. The _____ and _____ keys can be used to move to the next _____ in the workfile.

(The following assume that the correct element has been found and tracking is on.)

COPY - 1. Move _____ to the desired location. Push button.

2. Repeat step 1 for _____ _____ .

3. Press _____ to terminate COPY.

MOVE - 1. Move object to desired _____ Push button.

SCALE - 1. Move the _____ about the handle point. Push button.

2. To accurately scale press _____ to _____ and type in the scaling _____ .

3. _____ less than _____ reduce the element, greater than _____ enlarge the object.

ROTATE - 1. Move the cursor to rotate the element around its _____ point. Push button.

IMAGE - 1. The object will be imaged about the _____ line.

2. Keyboard options ____, ____, ____, ____ and "P" are used to _____ the line.

3. Unless Copy(C) is pressed the image will _____ the original element.

DELETE - 1. The object is deleted when this option is selected.

2. Use _____ to retrieve the deleted element from the workfile.

EDIT TEXT - 1. The _____ text will be _____ .

2. Add to the text or use _____ to delete characters.

3. Press _____ to accept edited text.

(The following assume that the desired group has been identified.)

COPY - 1. Enter new _____ _____ if desired.

2. Move the cursor to the desired _____ point. Push button.

3. Move the cursor to the desired _____ of the copy. Push button.

MOVE - 1. Move the cursor to the desired _____ point. Push button.

2. Move the cursor to the desired position of the _____ point. Push button.

SCALE - 1. Move the cursor to the desired _____ point. Push button.

2. Move the cursor to the desired _____ point. Push button.

3. Move the cursor to indicate the desired scale represented by the _____ line. Push button.

4. To accurately scale the group, press _____ for _____ and enter the _____. Press _____ .

ROTATE - 1. Move the cursor to the desired _____ point. Push button.

2. Move the cursor to the desired _____ point. Push button.

3. Move the rotation line with the cursor to the desired rotation. Push button.

IMAGE - 1. Position the _____ line as discribed earlier. Push button.

2. If the _____ option is used, enter the new group name desired.

SECTION 5
LEVELS

1. READING - CADAPPLE Manual - sections 3.9, 3.10.2
   3.10.9, 3.10.10

   Optional - CAD-TUTOR - Tutorial 8

2. WORKSHEET - LEVELS

3. PROBLEM - Add a border and title block to the earlier assignment of the 4 designs. Put the border and title block on its own level and put the text for the title block on its own level.

   Plot all 3 levels, the drawing, the border and the border with text.

4. STEPS of PROCEDURE - Hand-out "STEPS of PROCEDURE - LEVELS"

Worksheet 5

LEVELS

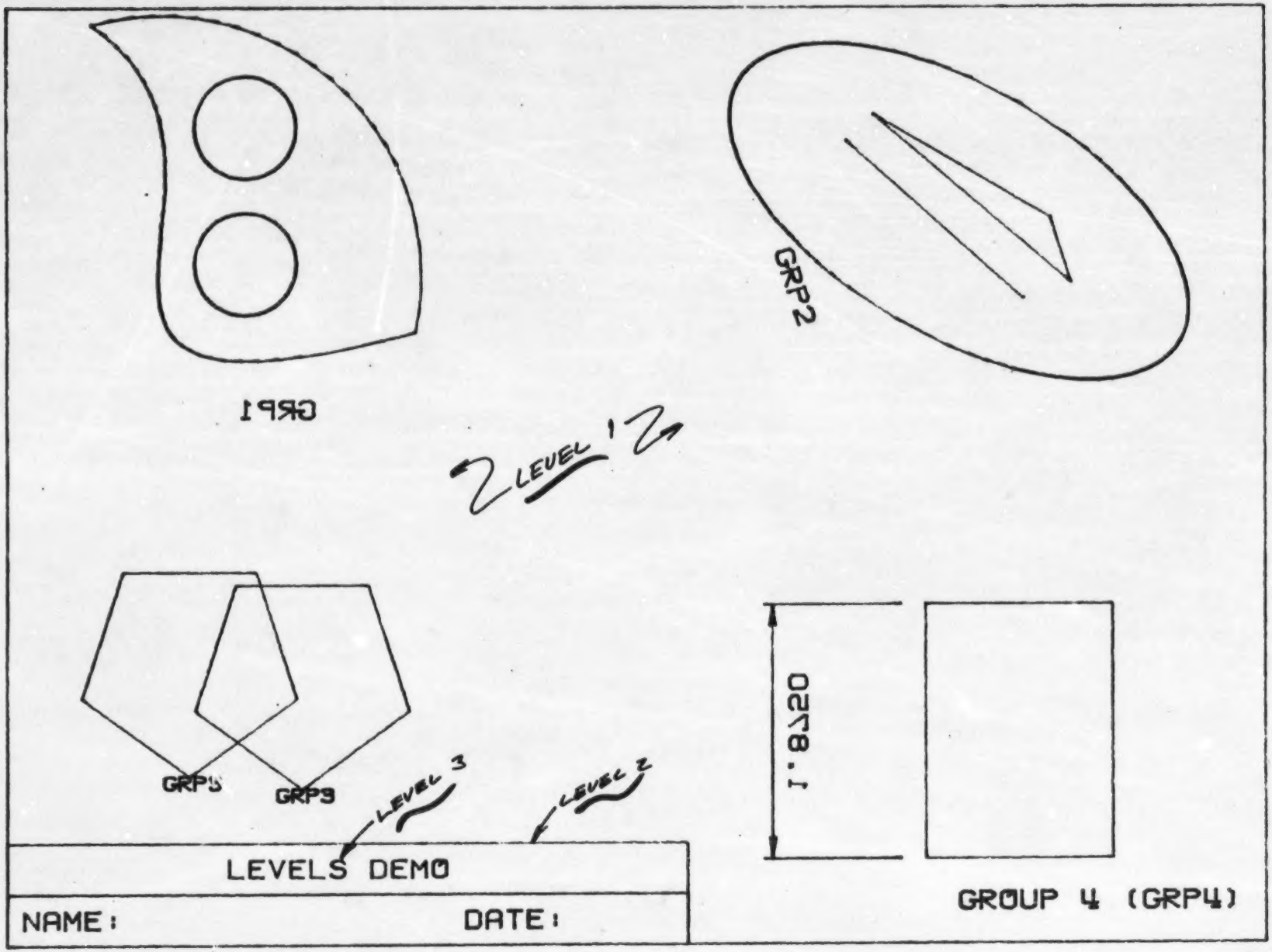
1. There are _____ levels available with the CADAPPLE system.

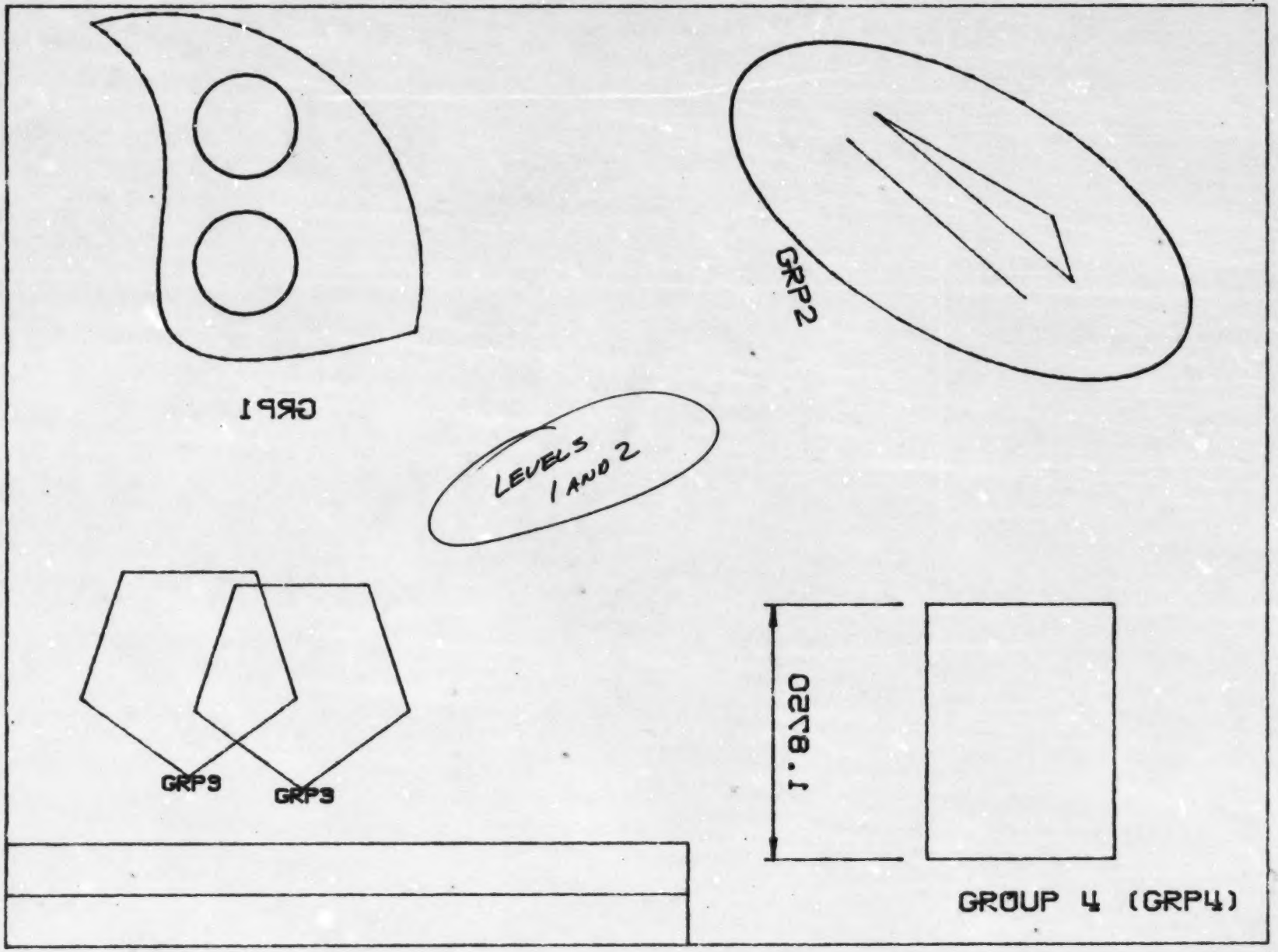
2. The level to be used is assigned in the _____ menu.

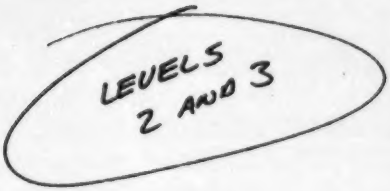
3. The level(s) to be displayed are determined in the _____ menu.

4. The plotter plots only the _____ that are displayed or "on".

5. The level must be selected _____ the objects are to be drawn.


GRP1
GRP2
LEVEL 1
GRP3
GRP4
LEVEL 3
LEVEL 2
1.875
LEVELS DEMO
NAME:
DATE:
GROUP 4 (GRP4)


GRP1
GRP2
LEVELS 1 AND 2
GRP3
GRP3
1.875
GROUP 4 (GRP4)



LEVELS DEMO

NAME: DATE:

STEPS of PROCEDURE
LEVELS

Select PROPERTIES from the main menu.

LEVEL - 1. Enter the _____ you wish to draw on next.

2. Press _____ .

NOTE: You may wish to change the GROUP neme.

3. Press _____ to return to the main menu.

Select SWITCHES from the main menu.

ALL LEVELS - 1. Type _____ and press _____ .

LEVELS - 1. Type _____ for any level you wish to displayed, _____ to turn off a level.

2. Press _____ .

3. Press _____ to return to the main menu.

4. After _____ is pressed the screen will be redrawn before returning to the main menu.

IN CLOSING

You may want to do a detail drawing as a final project for this unit. Review the Special Note and answer the questions below before starting.

Before you start your own drawing its VERY important to plan your work before you begin. Review these points before starting your work.

1. How many views will be needed?
2. Should dimensions be in feet & inches, fractions or decimals?
3. What size of work area do you need?
4. What size will you plot the drawing?
5. What do you want on each level?
6. What should be grouped together?
7. What increment will work best?
8. Will you need "template" lines?
9. Will you need to save windows as part of the workfile?
10. Will you use standard symbols?

SPECIAL NOTE!

To use the CADAPPLE system to its best advantage additional time should be spent learning features not covered in the assignments.

Special attention should be given to all PROPERTIES menus and options, SWITCHES and UNITS.

The CADAPPLE system does not automatically locate tangent points, ends of lines, parallels, perpendiculars or partial deletions. If a great deal of time is to be spent using CADAPPLE it would be suggested that you study how to overcome these shortcomings. Extensive use of WINDOW, OBJECT PROPERTIES, HANDLES and DEVISE SCALE are required. It is doutful that many of these skills will be directly required on other systems.

GETTING CADAPPLE "UP"

1. Turn on -
   Monitor(s)
   Digitizer (press STREAM button)
   Plotter (set for drawing size)

2. Place "BOOT" disk in BOTTOM (No.1) drive.

3. Place "WORK" disk in TOP (No.2) drive.

4. Turn on computer.

5. With promt, type "X", followed by "2D", RETURN .

6. With title page up, type RETURN .

7. Answer promt "Recover workfile (Y,N)?"
   Y - Load workfile that was created the last time the system was used.
   N - Clear out the workfile and start fresh (new drawing or load a saved drawing).

Once the workfile is loaded or cleared the MAIN MENU is displayed.

PREPARE CADAPPLE for "A" or "B" SIZE DRAWING

Starting with MAIN MENU.

1. Type "U" for UNITS.
2. Type "I" for INCREMENTS.
3. Type ".125" RETURN (.125 may be any increment)
4. Type "B" for BASE WINDOW.
5. Press RETURN , type "9.25" (A size) or "15" (B size).
6. Press RETURN , press RETURN .
7. Type "G" for GRIDS.
8. Type "1" RETURN .
9. Type "8" RETURN . (1 divided by the increment above)
10. Type "1" RETURN , type "8"(same as no. 9) RETURN .
11. Once the grids are drawn, type "Q" for QUIT.
12. Type "P" for PROPERTIES.
13. Type "T" for TEXT.
14. Type ".1" RETURN , type ".125" RETURN .
15. Type "Q" for QUIT.

You will return to the MAIN MENU.

SAVING YOUR WORK

Starting from the MAIN MENU.

1. Type "F" for FILER.

2. Type "S" for SAVE.

3. As instructed, remove the "BOOT" disk.

4. Insert a disk prepared for saving files.

5. Press RETURN .

6. Type in the name of the file.
   8 characters maximum.
   One example would be your last name.
   Write the name you use down, so that you will have it when you want to retrieve it.

7. Press RETURN .

8. The file will then be copied to the disk.

9. After the promt that the file has been saved, replace the "BOOT" disk.

10. Type "Q" for QUIT.

You will then return to the MAIN MENU.

LOADING A DRAWING

Special note:
Drawing are loaded on top of (merged with) any drawing that is presently in the computer. Use directions in SECTION 1 to erase the screen before loading a new drawing.

Starting with the MAIN MENU.

1. Type "F" for FILER.

2. Type "G" for GET.

3. As instructed, remove the "BOOT" disk and insert the disk with the needed file.

4. Press RETURN .

5. Enter the name of the file desired.

6. Press RETURN .

7. Type "Y" in responce to the prompt.

8. Type "N" in responce to the second prompt.

9. After the prompt saying that the drawing has been loaded, replace the "BOOT" disk.

10. Type "Q" for QUIT.

You will then return to the MAIN MENU.

PLOTTING THE DRAWING
on a HOUSTON INSTRUMENTS DMP-40

1. If an "A" size drawing is desired press the "SMALL" button on the plotter.

2. Load paper as instructed in the plotter manual.

Starting from the MAIN MENU.

1. Type "O" for OUTPUT.

2. Type "S" for SPECS.

3. Type "SPECA" and press RETURN .

4. Type "A" (plot option).

5. Type "0" RETURN , "9.25" RETURN , "0" RETURN , "7" RETURN .

6. Type "P" for PLOTTER.

7. Type "N" RETURN .

8. Type "N" RETURN .

9. Type "SPECA" RETURN .

10. Press RETURN .

11. Move cursor to the lower lefthand corner of the screen. Push button.

12. Move cursor to the upper righthand corner of the screen. Push button.

13. With everything ready, press RETURN .

14. The drawing will then be plotted.

15. After the prompt that the plot is complete, type "Q".

You will return to the MAIN MENU.